

Claims

We claim:

5 1. A method for forming a direct chip attach device comprising the steps of:

 attaching an electronic chip to a lead frame structure, wherein the electronic chip includes a bonding pad;

 attaching a conductive bump to the bonding pad;

10 placing the electronic chip and lead frame structure into a molding apparatus, wherein the molding apparatus has a well portion with a pin coupled to a first surface of the well portion;

 contacting the pin to the conductive bump; and

15 molding the electronic chip with an encapsulating material, wherein the pin masks the conductive bump to provide an opening in the encapsulating material over the conductive bump.

20 2. The method of claim 1 wherein the step of placing the electronic chip and the lead frame structure into the molding apparatus includes placing the electronic chip and the lead frame structure into the molding apparatus, wherein the well portion has a plurality of pins coupled to the
25 first surface.

 3. The method of claim 1 wherein the step of attaching the conductive bump includes attaching a gold stud to the bonding pad.

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 4. The method of claim 1 further comprising the step of coupling a solder ball to the electronic chip in the opening.

5. The method of claim 1 wherein the step of placing the electronic chip and the lead frame structure into the molding apparatus includes placing the electronic chip and the lead frame structure into the molding apparatus, wherein the pin has a flat upper surface and rounded upper edges.

6. The method of claim 1, wherein the step of attaching the electronic chip to the lead frame structure includes attaching a power MOSFET device.

7. A process for forming a flip-chip device comprising the steps of:

placing a sub-assembly into a mold apparatus having a cavity, wherein the sub-assembly comprises an electronic chip attached to a support substrate, and wherein the electronic chip comprises a first conductive stud coupled to the electronic chip;

contacting the first conductive stud with a first blocking device in the cavity; and

injecting an encapsulating material into the cavity to encapsulate the electronic chip, wherein the first blocking device masks the first conductive stud to form an opening in the flip-chip device.

8. The process of claim 7 further comprising the step of attaching a solder ball to the flip-chip device in the opening.

9. The process of claim 7 wherein the step of contacting the first conductive stud includes contacting the first conductive stud with a pin.

10. The method of claim 9, wherein the step of contacting includes contacting the first conductive stud with a pin having a flat upper surface and rounded upper edges to form a chamfered opening.

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11. The method of claim 7, wherein the step of placing the sub-assembly includes placing a sub-assembly having an electronic chip attached to a support substrate, wherein the support substrate includes a flag.

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12. The method of claim 11, further comprising the step of contacting the flag with a second blocking device in the cavity.

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13. The method of claim 7, wherein the step of placing the sub-assembly includes placing a sub-assembly comprising a power MOSFET device attached to a support substrate.

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14. The method of claim 7, wherein the step of placing the sub-assembly includes placing a sub-assembly having a gold conductive stud coupled to the electronic chip.

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15. The method of claim 7, wherein the step of placing the sub-assembly includes placing a sub-assembly having an electronic chip attached to a support substrate, wherein the support substrate includes a flag with a second conductive stud attached to the flag.

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16. The method of claim 15, further comprising the step of contacting the second conductive stud with a second blocking device in the cavity.

17. An apparatus for molding flip-chip devices comprising:

- a molding plate having a major surface;
- a cavity formed in the major surface for receiving a
- 5 chip device; and
- a pin coupled to a first surface of the cavity.

18. The apparatus of claim 15, wherein the first surface includes an opening for holding the pin.

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19. The apparatus of claim 15 wherein the pin and the molding plate are formed from a single piece of material.

20. The apparatus of claim 15 wherein the pin

15 comprises a flat upper surface with rounded upper edges.